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EXAMINER

CHEN, KEATH T

ART UNIT	PAPER NUMBER
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1712

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11/22/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/757,302	Applicant(s) HE ET AL.	
	Examiner KEATH T. CHEN	Art Unit 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,6 and 8-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,6 and 8-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The claim amendment filed on 09/27/2010, addressing claims 1-3, 6, and 8-20 rejection from the non-final office action (06/25/2010) by amending claims 1-2, 6, 8-13, and 15-20 and cancelling claim 3 is entered, and will be addressed below.

Claim Objection

Claim 2 recites “the selected area” in line 2. There is no antecedent basis of this limitation. “The selected area” of claim 2 will be examined as “spot”.

Claim 9 recites “circular areas” at the end of line 2. There is no antecedent basis of this limitation. This portion will be examined as “Spots”.

Appropriate corrections are required.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (US 6045671, hereafter ‘671), in view of Stirn (US 4596645, hereafter ‘645).

‘671 teaches some limitations of:

Claim 1: A combinatorial sputtering system (Fig. 14, col. 25, lines 23-24, the claimed “system for providing a plurality of different combinatorial materials”) for deposition (col. 25, line 29) is capable of depositing catalyst (see also col. 31, lines 10-

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11, the claimed “catalyst materials”), the array can be screened for resulting materials having useful properties (col. 6, lines 6-7, the claimed “for evaluation”),

thin-film deposition techniques may include sputtering technique, electron beam or thermal evaporation, ... (col. 19, lines 39-51, these are known physical vapor deposition), a processing chamber 256 under vacuum (col. 22, lines 45-46, Fig. 12 clearly applicable to Fig. 14, the claimed “sealable deposition chamber”), a substrate load-lock chamber 262 (col. 22, line 50, the claimed “a load lock chamber for receiving sample assemblies to be processed”), eight RF magnetron sputtering guns 110 ... inserted from the side of the reaction chamber in a complete circle (col. 25, lines 24-27, the claimed “the deposition chamber including a plurality of separately controllable plasma sources radially disposed about a central location within the deposition chamber such that the plasma directed from the source may be focused upon the central location”, note that deposition aiming toward the central location is considered a “focused” deposition), components are delivered ... **simultaneously** ... the power of two electron beam sources can be varied so that component A is delivered to the substrate in increasing or decreasing amounts while component B is either delivered in a constant amount or varied in the opposite direction of component A. In another example, two or more components are delivered using any of the delivery techniques described herein (col. 18, lines 28-38, further underlines the claimed “separately controllable plasma sources”), the substrate is attached to a shaft (col. 25, lines 27-28, the claimed “a substrate disposed upon a shaft”, Fig. 14 shows the shaft is “vertically positioned at the central location of the deposition chamber around which shaft (and?)

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the substrate may axially rotate”), masking pattern 134 (col. 25, line 33, see Fig. 14 for four discrete separated areas, the claimed “having a plurality of spots thereon to which the plasma is directed”), film thickness and uniformity can be controlled by the spraying time (col. 28, lines 25-28, along with previously cited col. 18, lines 28-38, is the claimed “wherein the deposition of plasma of a predetermined type and in a predetermined amount upon each selected spot by each plasma gun is individually controlled by varying an amount of power and an amount of time of deposition for the type of material on a selected area for each gun”);

the substrate is attached to a shaft 130 having linear and rotational motion (col. 25, lines 27-28, the claimed “the substrate being controllably positionable within the deposition chamber such that a first spot upon the substrate may be positioned in accordance with a selection from a matrix of z, x coordinates that define the location of the spot, wherein, z defines axial rotation coordinates that align the spot on the substrate with one of the plasma gun clusters, x defines vertical coordinates that align the same spot with the same one of the plasma gun clusters”, the apparatus is capable of “each such alignment occurring when the plasma gun clusters are sequentially focused upon each spot as the substrate rotates to a fixed radial position around the central axis”);

system 250 ... includes a processor (col. 22, lines 66-67) film thickness and uniformity can be controlled by the spraying time, substrate-nozzle distance, ... and/or positioning the spray gun, spray nozzle or substrate, etc. (col. 28, lines 25-28, the claimed “power, time and material type of the plasma deposition from each source”), the

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components can be delivered to predefined regions on the substrate ...sequentially (col. 30, lines 44-46, the claimed “for each spot when the plasma source and the substrate are sequentially aligned”).

As the components are delivered ... **simultaneously** ... in another example, two or more components are delivered using any of the delivery techniques described herein (col. 18, lines 28-38), **several sputter guns are focused toward the same spot** but these guns are not connected in a cluster; as the guns are in a circle, there has to be several groups of guns focused to the substrate holder when it is facing different directions. '671 further teaches that the substrate as large as 100 m² (col. 7, lines 50-51).

Fig. 14 of '671 teaches a shaft 130 having linear and rotational motion (col. 25, lines 27-28) with one dimension linear motion, does not explicitly teaches the linear motion in both x and y direction, therefore, does not explicitly teaches the other limitations of:

Claim 1: (1A) **each** of the plurality of separately controllable plasma sources comprising a cluster of plasma guns each gun connected to a certain deposition material type to be deposited and oriented with respect to the central location such that each gun in the cluster may be simultaneously focused upon a selected spot in the central location; (1B) (substrate being controllably positionable within the chamber ... with a selection from a matrix of z, x) and y coordinates; the substrate are sequentially

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aligned according to the z, x, y coordinates of the matrix; (1C) (the plasma source and the substrate are sequentially aligned) with respect to each cluster.

'645 is an analogous art in the field of reactive sputtering of semiconductor film (title, similar to '671's sputtering). '645 criticizes the original three vertical S-Guns not suitable for co-sputtering (col. 3, lines 65-67) and the modification was to reshape ... so there is one sputtering gun 31 mounted with a vertical sputtering axis directly below the center of a substrate holder 32, and two S-Guns, 33 and 34, one on each side, each having its sputtering axis at an angle from the vertical and pointing at the center of the substrate holder 32 (Fig. 2, col. 3, lines 2-8, sputtering guns 33, 34, 35, together, is the claimed "cluster of plasma guns ... simultaneously focused upon a selected spot in the central location", the limitations of 1A).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced each, or each groups) of the sputtering guns 110 in Fig. 14 of '671 with the S gun assembly of '645, for the purpose of co-sputtering, as taught by '645 (col. 3, lines 65-67) and required by '671 (col. 18, lines 28-38). Note as '671 requires groups of guns when substrate facing different direction, this combination would have had the limitations of 1C "the plasma source and the substrate are sequentially aligned with respect to each cluster".

In a different embodiment (Fig. 5), '671 teaches the substrate may also be **translated** relative to the frame 206 so that shutter masks 202, 203 may be positioned at selected regions on the substrate (col. 17, lines 44-46) instead of by moving the X--X and Y--Y shutter masks 202, 203 (col. 17, lines 40-41) and/or forming the two dimension pattern of Figs. 2-4. Therefore, needs a two dimensional motion mechanism.

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have added a two dimension motion mechanism (the limitations of 1B), as taught by Fig. 5 of '671, to the combined apparatus of '671 and '645, for the purpose of forming two dimensional pattern in Figs. 2-4 of '671.

'671 further teaches the limitations of:

Claim 2: system 250 ... includes a processor (col. 22, lines 66-67, processor has programmable parameters, or obviously to programmed to control the following operation), the components can be delivered to predefined regions on the substrate ...sequentially (col. 30, lines 44-46, the claimed "controlling the plasma sources comprises inputting parameters"), the power of two electron beam sources can be varied ... in another example, two or more components are delivered using any of the delivery techniques described herein (col. 18. lines 31-37, the claimed "determined for the selected area, the parameters comprising the amount of power"), this system ... provides spatial variation of gas mixture and gas exposure time over the substrate (col.

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31, lines 1-3, the claimed “the amount of time, and the characteristics of the material type to be deposited by the plasma source upon each spot of the substrate”).

Claim 12: components of target materials can be selectively deposited onto the substrate 356 sequentially or simultaneously as a mixture of two or more target materials (col. 28, lines 10-12, the claimed “the plasma sources are controlled such that the materials originating from the sources are deposited upon each spot of the substrate in either 1) a sequential layer deposition and 2) a co-deposition”).

3. Claims 6, 8-9, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over ‘671 and ‘645, further in view of Corderman et al. (US 6491967, hereafter ‘967).

‘671 and ‘645, together, teach all limitations of claim 1, as discussed above.

The embodiment in Fig. 14 of ‘671 teaches masking pattern 134 (col. 25, line 33, see Fig. 14 for four discrete separated areas (the claimed “the substrate includes multiple separately defined spots”) and eight RF magnetron sputtering guns 110 ... inserted from the side of the reaction chamber in a complete circle (col. 25, lines 24-27, the claimed the substrate ... “is centrally positioned within the chamber”), the substrate is attached to a shaft 130 having linear and rotational motion (col. 25, lines 27-28, the claimed “the substrate being moveable”, “such that each separately defined area upon the surface of the substrate may be positioned” and “in alignment with the focus of a plasma source”. Fig. 14 of ‘671 does not teach “each separately defined spot upon the

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surface of the substrate may be positioned by control means for the x-y table alignment with the focus of a plasma source” of claim 6.

Fig. 5 of '671 teaches the **substrate** may also be **translated** relative to the frame 206 so that shutter masks 202, 203 may be positioned at selected regions on the substrate (col. 17, lines 44-46) instead of by moving the X--X and Y--Y shutter masks 202, 203 (col. 17, lines 40-41), therefore, teaches a x-y table that moves the substrate.

'967 is an analogous art in the field of plasma spray (title) in combinatorial high throughput screening (abstract). '967 teaches a robot arm (the claimed program controlled) that either with 6-axis robot or a 2 axis x-y manipulator can also be used (Fig. 1, col. 3, line 66 to col. 4, line 3, the claimed program controlled x-y table and control means for the x-y table).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the **translation** of the substrate, instead of translation of mask, as required by '671 (col. 17, lines 40-46), particularly to have replaced the shaft 130 in Fig. 14 of '671 with the robot arm, as taught by '967, because its commonly known and suitability. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

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In view of the pattern (col. 12, lines 44-50) in Figs. 1-2 of '671 also teaches the "the multiple separately defined selected spot of the substrate are arranged in the matrix defined by columns and rows" of claim 8 and "the relationship of the number (N) of separately defined spot in the rows and a number of separately defined circular areas in the columns is $rows_N = columns_N$ " of claim 9.

'671 further teaches a system 250 ... includes a processor (col. 22, lines 66-67, the claimed "programming") film thickness and uniformity can be controlled by the spraying time, substrate-nozzle distance, ... and/or positioning the spray gun, spray nozzle or substrate, etc. (col. 28, lines 25-28, the claimed "selecting ... 1) an ion emitted by each plasma source within a cluster; 2) the amount of power and the duration of operation for the source" of claim 15).

Alternatively, the above combination would also have had the limitations of: a robot arm (imported from '967, the claimed "programming"), while film thickness and uniformity can be controlled by the ... positioning the substrate, etc. (col. 28, lines 25-28, the claimed "the position of the substrate such that each selected spot of the substrate is exposed to the plasma source at the selected power and at the selected duration" of claim 15).

'671 teaches components are delivered ... **simultaneously** ... the power of two electron beam sources can be varied so that component A is delivered to the substrate

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in increasing or decreasing amounts while component B is either delivered in a constant amount or varied in the opposite direction of component A. In another example, two or more components are delivered using any of the delivery techniques described herein (col. 18, lines 28-38, the claimed “selecting plasma sources and controlling the amount of power and the duration of operation of the source includes controlling the sources in the same operation such that plasma materials from the sources are **co-deposited** with respect to each spot on the surface of the substrate” of claim 16).

‘671 also teaches the components can be delivered to predefined regions on the substrate ...**sequentially** (col. 30, lines 44-46, the claimed “selecting plasma sources and controlling the amount of power and the duration of operation of the sources includes controlling the sources in the same operation such that plasma materials from the sources are deposited as layers with respect to each spot on the surface of the substrate” of claim 17).

4. Claims 10-11, 13, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over ‘671, ‘645, and ‘967, further in view of Chiang et al. (US 7544574, hereafter ‘574).

‘671, ‘645, and ‘967, together, teach all limitations of claims 8 and 15, as discussed above. ‘671, ‘645, and ‘967, together, do not teach the limitations of: “the relationship of the number (N) of separately defined spots in one column to the number of separately defined spots in an adjacent column is spots in column_N = N and spots in adjacent column_{N+1} = N+1” of claim 10 nor “the relationship of the number of separately

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defined spots in one row to the number of separately defined spots in an adjacent row is: spots in row_N = N and spots in adjacent row_{N-1} = N-1” of claim 11.

‘574 is an analogous art in the field of systems for discretized, combinatorial processing of regions of a substrate (abstract) in thin film processing (field of the invention) such as plasma sputtering (col. 16, lines 55-56). ‘574 teaches the processing cell have a **circular** shape ... the parallel processing structure, which may be a plurality of separate cells, or a plurality of cells in a single structure, is configured such that every other region 903 is processed with the edge of the processing cells contacting only the corners of the regions to be processed (Figs. 9B-C, and 9E, col. 23, line 62 to col. 24, line 2, the claimed “column_N = N and spots in adjacent column_{N+1} = N+1” of claim 10 and “column_N = N and spots in adjacent column_{N+1} = N-1” of claim 11).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced the arrangement of array on a substrate as shown in Figs. 1-4 of ‘671 with the arrangement of the plurality of circular processing cell as shown in Figs. 9B-C and 9E of ‘574, for the purpose of suitable cell arrangement. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

‘574 further teaches the substrate may contain depressed regions on which combinatorial processes take place (col. 13, lines 48-50, see also Fig. 1C, lower right,

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the claimed “the substrate comprises a side surface of a block positioned within the central location of the chamber, the block having a multiplicity of cylindrical substrate elements extending from the side surface thereof, each cylindrical substrate element individually defining a selected spot, the cylindrical substrate elements maintained in an array of columns and rows formed within the block, in which the upper surfaces of the cylindrical substrate elements comprise the discrete spot exposed to the sources” of claim 13.

Claims 18-20 are rejected for substantially the same reasons as claims 15-17 rejection, respectively, as discussed above.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over ‘671, ‘645, ‘967, and ‘574, further in view of Wang et al. (US 20050035002, hereafter ‘002).

‘671, ‘645, ‘967, and ‘574, together, teach all limitations of claim 13, as discussed above. ‘574's Fig. 1C also show the limitations of “the cylindrical substrate elements are inset within the block in a matrix” of claim 14.

‘671, ‘645, ‘967, and ‘574, together, do not teach the limitations of: “a plate having a plate matrix of openings concentric with the matrix of elements in the block is applied facing the surface of the block, such that the openings in the plate are aligned with the elements and a cross-section area of an opening in the plate is less than a

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cross-section area of the surface of the corresponding concentric cylindrical element” of claim 14.

‘002 is an analogous art in the field of electric screening system (title) in the detachable electrode arrangement provides an electrode array for combinatorial synthesis ([0067], second last sentence) applicable to physical vapor deposition PVD ([0062], second sentence). ‘002 teaches a holder 170 includes a holder block 171 and a back plate 180 which holds RDE 20 in place ([0068], see also [0066]), a holder block 171 (Fig. 15 and 16, [0070], the claimed plate) with the openings 172 sized to be slightly smaller than the outside diameter of electrodes 20 for light press fitting of the electrodes 20 to the holder block 171 ([0070], second last sentence, note 20 corresponds to the claimed inset).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the holder arrangement including a holder block/plate with opening smaller than the electrodes/inset, as taught by ‘002, in the combined apparatus of ‘671, ‘967, and ‘574, for its suitable use as a holder for the combinatorial synthesis in the PVD system. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

Response to Arguments

Applicant's arguments filed on 10/20/2010 have been fully considered but they are unconvincing in light of the new ground of rejection above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./
Examiner, Art Unit 1712

/Ram N Kackar/
Primary Examiner, Art Unit 1716